II.

PROJECT DESCRIPTION

A. PROJECT LOCATION

The SCM is designed as a model rule to be adopted by the local districts throughout the State of California. There are 35 individual districts in California. (The geographical boundaries of each district are shown in Figure II-1.) If a district decides to adopt the SCM in the future, the district's version of the SCM would apply to affected persons within the geographical boundaries of that district. The districts were created by the California Legislature as the public agencies responsible for developing and enforcing air pollution control regulations for pollution sources under their jurisdiction. By statute, districts are required to adopt or amend and enforce rules that will reduce air pollutant emissions in order to attain and maintain federal and State ambient air quality standards.

B. ARCHITECTURAL COATINGS DESCRIPTION

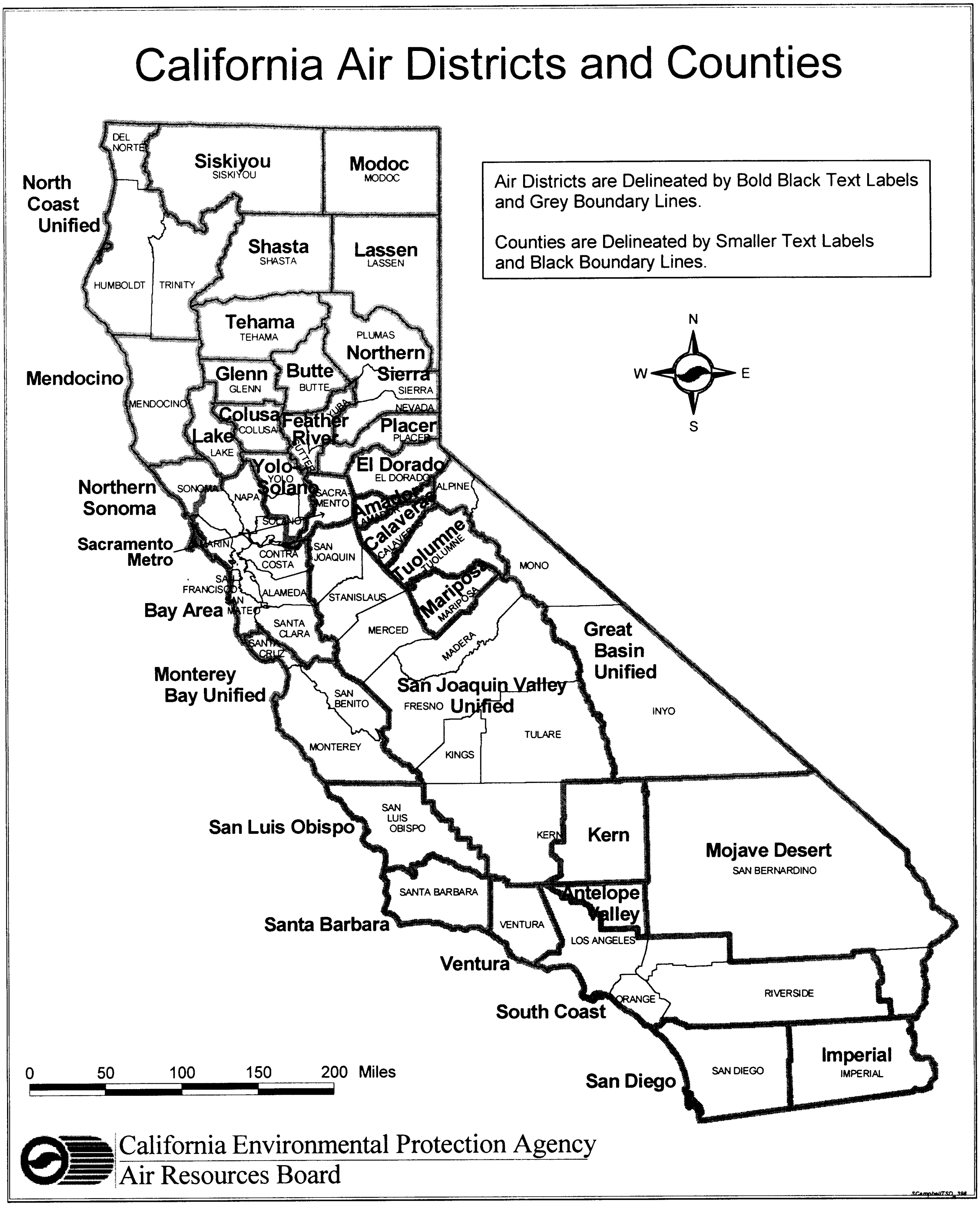
Architectural coatings, as defined in the SCM, are coatings that are applied to stationary structures and their appurtenances at the site of installation, to portable buildings at the site of installation, to pavements, or to curbs. To be classified as an architectural coating, a coating must be applied in the field, at the site of installation, rather than in a shop or factory where pollution control equipment may be installed. Encompassed in the architectural coatings category are coatings applied to homes, schools, factories and processing plants, and public utilities and structures. The “appurtenances” included in the definition range from pipes to downspouts.

Coatings are used primarily for beautification and protection. Architectural coatings are designed to be applied to a variety of surfaces, including metal, wood, plastic, concrete, bricks, and plaster. Some coatings are designed to be used as topcoats, while others are intended to be applied to the substrate with other coatings adhering to them. Some coatings are designed to impregnate the surface, while others are transparent and allow the substrate to be visible. Some of the specialty coatings in the architectural coatings category are formulated to withstand traffic, heat, chemicals, caustics, and abrasion. Architectural coatings are applied by a variety of methods including, brush, roller, spray gun, or specialized equipment. Architectural coatings must also meet the application and performance expectations of do-it-yourselfers, professional painting contractors, and maintenance personnel.

Architectural coatings are formulated using four main categories of ingredients:

- Resins (polymers or binders) that bind the pigments and additives together and form a film upon drying. Sometimes copolymers are used to modify the properties of the

FIGURE II-1



California Air Districts and Counties
Air Districts are Delineated by Bold Black Text Labels and Grey Boundary Lines.
Counties are Delineated by Smaller Text Labels and Black Boundary Lines.
N
W
E
S
DEL NORTE
North Coast Unified
Siskiyou
SISKIYOU
Modoc
MODOC
Shasta
SHASTA
Lassen
LASSEN
HUMBOLDT
TRINITY
Tehama
TEHAMA
PLUMAS
Northern Sierra
Mendocino
Glenn
GLENN
Butte
BUTTE
SIERRA
NEVADA
MENDOCINO
Colusa
COLUSA
Feather River
YUBA
SUTTER
Placer
PLACER
Lake
LAKE
Yolo Solano
YOLO
El Dorado
EL DORADO
ALPINE
Northern Sonoma
SONOMA
NAPA
SACRAMENTO
Amador
AMADOR
Calaveras
CALAVERAS
SOLANO
Sacramento Metro
MARIN
CONTRA COSTA
SAN JOAQUIN
Tuolumne
TUOLUMNE
MONO
SAN FRANCISCO
ALAMEDA
STANISLAUS
Mariposa
MARIPOSA
Bay Area
SAN MATEO
SANTA CLARA
MERCED
Great Basin Unified
SANTA CRUZ
MADERA
Monterey Bay Unified
SAN BENITO
San Joaquin Valley Unified
FRESNO
INYO
TULARE
MONTEREY
KINGS
SAN LUIS OBISPO
San Luis Obispo
KERN
Kern
Mojave Desert
SAN BERNARDINO
SANTA BARBARA
Antelope Valley
Santa Barbara
VENTURA
LOS ANGELES
Ventura
ORANGE
RIVERSIDE
South Coast
0
50
100
150
200
Miles
San Diego
SAN DIEGO
Imperial
IMPERIAL
California Environmental Protection Agency
Air Resources Board

primary resin. Some resins used in architectural coatings include alkyds, latex, oils, vinyls, acrylics, cellulosics, epoxies, urethanes, and polyurethanes.

- Pigments, finely ground powders dispersed in the paint, provide its color, ability to hide the underlying surface, and other properties.

- Solvents are the volatile carriers used to control the viscosity of the paint and provide application properties. Some solvents used are water, alcohols, glycols, glycol ethers, ketones, esters, and aromatic or aliphatic hydrocarbons.

- Additives, or specialty chemicals which assist in manufacture and application, may improve the properties of the finished film. Some examples of additives include preservatives, wetting agents, coalescing agents, freeze-thaw stabilizers, anti-foam agents, and thickeners.

In addition, extenders such as limestone, clay, gypsum, talc, and silica are sometimes added for performance characteristics or to control cost, but extenders generally are detrimental to application, gloss, and overall durability of coatings. Therefore, the highest performing paints consist of a balanced formulation of pigments and binders. They are available in a wide range of colors, gloss, and performance characteristics.

One important criterion for selecting coatings is durability. Exterior paints must be able to stand up to sunlight, humidity, water, heat, cold, ice, snow, and air pollution. Important characteristics of interior paints are their color, gloss, and ability to withstand scrubbing.

Architectural coatings are usually purchased ready-to-use, although some come in two or more components that must be mixed prior to application. Coatings are sometimes thinned when they are too thick to spray or brush, or when low temperature or high humidity hamper application properties. Waterborne coatings are thinned with water only, whereas solvent-based coatings can only be thinned with organic solvents. Similarly, brushes, rollers, and spray guns used with waterborne coatings are cleaned with water, while equipment used with solvent-based coatings is cleaned with organic solvents. However, solvents may also be used in the final step to clean spray guns that have been used to apply waterborne coatings to prevent deterioration of the equipment.

C. ARCHITECTURAL COATINGS RULES

1. District Rules

The ARB does not have jurisdiction over the control of emissions from architectural coatings. VOC emissions from architectural coatings operations are currently regulated by a number of local district rules. Under these rules, emissions are controlled by limiting the VOC content, measured in grams per liter, of the architectural coatings sold and applied in the district. A table of the current district rules, including the applicable VOC limits, is included in Appendix B of the NOP/IS (Appendix B of this Draft Program EIR). Most of these current district rules, as well as the proposed SCM, apply to those persons who supply, sell, apply, solicit the application of, or manufacture such coatings.

Some of the limits in these existing rules were based on the ARB's 1989 SCM for architectural coatings. A consortium of California air pollution control districts, the ARB, U.S. Environmental Protection Agency (U.S. EPA) Region IX, and coatings manufacturers developed the provisions in the 1989 SCM.

2. National Architectural Coatings Rule

Section 183(e) of the federal Clean Air Act requires the U.S. EPA to develop a national architectural coatings rule. On August 14, 1998, U.S. EPA promulgated the final version of its national rule for architectural coatings. The national rule took effect on September 13, 1999.

The national rule applies only to manufacturers and importers of architectural coatings, while the SCM applies to manufacturers, distributors, and users of architectural coatings. The national rule also contains over 20 categories that are not included in the SCM or district rules. In addition, the national rule definitions for many categories differ from those in the SCM.

In all but two categories, roof coatings and traffic coatings, the national rule has the same or higher (less restrictive) VOC limits than the SCM and most districts' rules (states or local governments are allowed to adopt more stringent emission standards). Because both the national rule and the district rule are in force in a district that has adopted an architectural coatings rule, the ARB has tried to harmonize the provisions of the national rule and the proposed SCM.

For the most part, California districts will not see additional emission reductions from the national rule, since the majority of the national limits are equal to or higher than the districts' limits. Many nonattainment districts still need additional emission reductions from architectural coatings and other emissions categories to improve air quality. Therefore, it is important that the proposed SCM be adopted, and that districts continue to amend their rules based on the SCM.

D. ARCHITECTURAL COATINGS EMISSION INVENTORY

1. Emission Inventory

Architectural coatings are the largest segment of the total paint market in the U.S. In 1996, shipments of architectural coatings accounted for just over one-half of the total industry shipments. Architectural coatings are sold to do-it-yourself (DIY) consumers, painting contractors, and commercial and industrial maintenance users through company stores, independent dealers, mass retailers, and home improvement centers.

Emissions from architectural coatings in California are estimated to be about 130 tons per day, on an annual average, of VOCs. This represents about nine percent of the total stationary source emissions, and about four percent of all VOC emissions statewide.[1] This 130 tons per day is more than all the VOC emissions from petroleum refining and marketing combined, and is

[1] This percentage may change in the future due to the impact of the latest motor vehicle emissions estimates (EMFAC 2000).

comparable in size to the VOC emissions from the emission categories of pesticides, degreasing operations, and all other coatings.

The 1998 ARB survey data (see below), based on reported 1996 sales, indicate total statewide architectural coatings sales of approximately 87 million gallons, resulting in over 72 million pounds of VOC emissions, or slightly more than 0.8 pounds of VOC emissions per gallon of coating (ARB, 1999b). Waterborne coatings account for roughly 82 percent of the market.

2. Emission Inventory Issues

a. Emission Inventory versus Ambient Monitoring Data

The Environmental, Legislative, and Regulatory Advocacy Program of the California Paint and Coatings Industry Alliance (EL RAP, 1998) states that emission inventories estimate the amount of VOC emissions from architectural coatings at two to four percent of total atmospheric VOC. EL RAP contends that this differs from ambient monitoring data, which show substantially lower concentrations. EL RAP states that this raises uncertainties regarding the extent to which architectural coating VOC emissions contribute to ozone formation, and under what conditions. However, our review of the data does not support the supposed differences, as discussed further below.

For example, EL RAP claims that the South Coast Air Quality Management District's (SCAQMD) emission inventory shows that in the South Coast Air Basin (SoCAB), architectural coatings contribute about two to four percent of the total VOC emissions (including biogenic VOCs). But they say a recent monitoring and source apportionment study found that the VOCs attributable to architectural coatings was only 0.2 percent on average, or about 1/20th the amount predicted in the SCAQMD emission inventory. EL RAP suggests the discrepancy may be due to underestimation of the emissions from other sources in the inventory, but also to overestimation of architectural coatings emissions. We do not believe there is such a discrepancy.

In ARB's published 1996 emission inventory, architectural coatings are estimated to contribute statewide 130 tons per day of reactive organic gases (ROG), out of a total of 3200 tons per day of ROG from all sources, and 1470 tons per day of ROG for stationary sources and area sources. Thus, emissions of architectural coatings contribute about nine percent of stationary/ area sources and four percent of total emissions statewide. The 1996 inventory data for architectural coatings are based on the 1990 ARB architectural coatings survey. Updates are in progress based on the 1998 ARB survey data and indicate similar proportions.

Source apportionment studies are used to evaluate and improve emission inventories, which are in turn used in modeling for ozone. In these studies, representative source profiles are obtained from the major emission sources in the inventory including vehicular emissions (exhaust, evaporated fuel, and liquid fuel), architectural and industrial solvents, and petrochemical production and oil refining. Biogenic emissions are important to include in source apportionment studies in the eastern part of the U.S. where there are abundant forests, but biogenics are a smaller source of emissions in the western part of the country where conditions are more arid. Profiles of VOCs from representatives of these source types are used to translate the ROG emission inventory to the speciated inventory. Continuous VOC monitors such as

Photochemical Assessment Monitoring (PAMS) stations are used to collect the ambient data that the model apportions to the respective sources (Watson *et al.*, undated).

The source apportionment study cited to us by the commenter was that of Fujita *et al*. (1997). The speciated data for architectural coatings was from earlier work by Fujita. The authors reported that surface coatings were a major contributor to ambient non-methane hydrocarbons (NMHC) in the SoCAB. Surface coatings contributed three to five percent to the ambient NMHC in three ARB monitoring sites, and five to seven percent for eight Coordinating Research Council (CRC, the sponsor of the study) sites.

The work of Fujita *et al.* is also reported by Watson *et al.* (undated). This source specifies that architectural coatings contributed an average of 3.2 to 5.0 percent (three ARB sites) or 0.3 to 1.1 percent (eight CRC sites) to the NMHC in Los Angeles. Industrial coatings contributed 1.7 to 9.3 percent (ARB sites) or 4.1 to 6.9 percent (CRC sites), while other coatings contributed 1.7 to 10 percent or 1.1 to 8.9 percent, respectively. However, the coating profiles used as VOC source profiles as percent of NMHC mass were from Censullo *et al.* (1996), and represented quick dry primers, sealers, and undercoaters and graphic arts coatings, both of which are solvent-borne. These two categories represented only 1.4 percent and 2.5 percent, respectively, of the ARB's 1998 architectural coatings survey (ARB, 1999b). Thus, the large contribution of water-based coatings was not represented.

Fujita (1999) stated that the Fujita *et al*. monitoring and source apportionment studies quoted by EL RAP were primarily designed to measure motor vehicle emissions, and not to focus on architectural coatings, so the results should not be considered to be representative of coatings in the Los Angeles area. Further, the architectural coating speciation profiles reflected only solvent-based coatings, not water-based coatings. Also, the sampling and analysis methods would not have measured the high molecular weight, polar, hydrophilic hydrocarbons that are common in water-based paints, but would instead have identified only the hydrocarbons more commonly contained in solvent-based coatings. Thus, the architectural coatings contribution in the source apportionment study reflects only the contributions of solvent-based coatings, not water-based coatings.

ARB concludes that because waterborne coatings make up roughly 80 percent of the inventory (ARB, 1999b), and assuming the solvent-borne coatings made up an average of one percent of the inventory in the source apportionment study, the real percentage of the architectural coatings inventory in the source apportionment can be estimated to be four percent. This is the same number as the ARB reports in its emission inventory.

The ambient monitoring techniques in the source apportionment studies have been designed primarily to measure hydrocarbons emitted by motor vehicles. Insofar as some of these hydrocarbons are also emitted from the evaporation of solvent-based architectural coatings, it would be difficult to separate the coatings' contribution from that of the vehicles. In addition, since the monitoring techniques have not been designed to measure many of the VOCs used in water-based coatings, such as glycol ethers, we do not believe that ambient monitoring data supports the statement that architectural coatings contribute substantially lower concentrations than the estimated two to four percent contribution of VOCs to current emission inventories.

As mentioned previously, routine ambient air quality monitoring sites measure ozone, not VOC and NO_x. The PAMS monitors or special studies such as the Southern California Ozone Study (ARB, 1997) or the Central California Ozone Study (ARB, 1999a) are needed to better understand the emissions of precursors. These special studies are very expensive and are run infrequently, but the results are used to improve emission inventories.

b. Biogenic Emissions

In its concept paper, EL RAP (1998) attributes 60 percent of the atmospheric VOCs to be from natural sources (trees and vegetation) and 40 percent from man-made sources (motor vehicle exhaust, gasoline evaporation, and solvent use). However, for California, ARB believes this is a misleading comparison. As discussed below, in the South Coast Air Basin (SoCAB), anthropogenic VOC emissions are greater than 90 percent. In general, biogenic contributions to peak ozone readings in urban areas (where ozone violations occur) are in the five to 15 percent range.

In response to particular stimuli, trees such as oaks, aspens, cottonwoods, eucalyptus, pines, firs, magnolia, cypress, and spruce emit specific hydrocarbons such as isoprene, mono- and sesqui-terpenes, methyl butenol, and other semi-volatile and oxygenated compounds. The emissions are connected to the life cycle of the trees, seasonal factors, photosynthetic active radiation, and ecological factors such as drought or sudden rains. The range of biogenic emissions from these plants varies by a large factor because plants respond to daily stimuli for growth and development, and therefore these processes are difficult to estimate. Another key issue is that biogenic emissions occur mostly in rural communities, away from urban centers where the ozone formation process is most intense.

Before the late 1980s, scientists believed that biogenic hydrocarbons contributed little or nothing to the accumulation of ozone precursors in either rural or urban environments. However, two papers in the late 1980's began to change that view, and since then interest and research on biogenic emissions has increased (Chameides and Cowling, 1995).

The role of biogenics emerged in the National Research Council's (NRC) 1991 report, *Rethinking the Ozone Problem in Urban and Regional Air Pollution* (Seinfeld *et al.*, 1991). In that report, the NRC reported that biogenic VOCs and anthropogenic NO_x can significantly affect ozone formation in urban and rural parts of the U.S., and recommended that in the future, biogenic VOCs be more adequately assessed to provide a baseline against which the effectiveness of ozone control strategies can be compared.

Since the early 1980s, the ARB has sponsored research to measure emission rates for native plant species, agricultural crops, and ornamental plants grown in California. Inventories of biogenic emissions have been developed for the major air basins in California by combining emission rates with surveys of species-specific biomass densities (ARB, 1993).

Biogenic emissions in California are primarily in the areas of dense vegetation such as the alpine areas of San Diego, Los Angeles, Kern, and Ventura Counties. These areas are elevated and downwind of the major urban centers in the South Coast, San Diego, and Central Coast air basins. Sustained mixing from high above the air basins down to the urban centers is required for biogenic emissions to play a significant role in ozone production. Fortuitous meteorological patterns would be required for this mixing to occur, and even under these conditions biogenic emissions are too diffuse to contribute significantly to ozone production (Lashgari, 1999).

Results of air quality modeling by the ARB in the 1987 Southern California Air Quality Study show that biogenic emissions have minimal effect in the urban areas of the Los Angeles basin where the peak ozone concentrations occur. These results reflect the fact that over 90 percent of the VOC emissions in the area are anthropogenic and that most of the biogenic emissions are emitted in unpopulated areas downwind of the urban areas. Overall, biogenic VOCs appear to play a small role in ozone formation in the urban portions of the air basin. However, as further progress is made to reduce anthropogenic VOC emissions, biogenic VOC emissions will increase in relative importance in urban areas (ARB, 1993).

A study by Arey *et al.* (1995) showed that the sum of the estimated isoprene and monoterpene emissions in the South Coast Air Basin is 130-190 tons per day, compared to the estimated 1600 tons per day of anthropogenic VOCs in the 1987 emission inventory for the South Coast Air Basin (SoCAB). It has been estimated that the hydrocarbon emissions need to be reduced to 180 tons per day for the SoCAB to meet the NAAQS for ozone; thus it appears that biogenic emissions alone could cause ozone exceedances, although the spatial distribution of the biogenic emissions make this unlikely.

A study by Benjamin *et al.* (1997) showed that the combined isoprene and monoterpene emissions were estimated to be 125-140 tons per day for an average summer day in the SoCAB. (Isoprenes are VOCs typically emitted from deciduous trees, while monoterpenes are emitted by conifers). On a mass basis, the biogenic VOC emissions inventory of the SoCAB represents about 10 percent of the anthropogenic emissions. However, since the majority of the biogenic emissions occur in the mountains on the northern and eastern boundaries of the SoCAB, downwind of the most heavily populated areas, the actual impact of these emissions on air quality is probably less than suggested by the mass of the inventory. The monitoring and source apportionment study discussed above (Fujita *et al.*, 1997) found that biogenic emissions were an insignificant contributor to the speciated non-methane hydrocarbons in the SoCAB.

California has a state-of-the-art biogenic hydrocarbon simulation program built upon an advanced research program. The Biogenic Emission Inventories through Geographic Information Systems (BEIGIS) has recently simulated data for the 1997 Southern California Ozone Study. The results of the 1997 Southern California Ozone Study are still being analyzed. A biogenic emission inventory for all of California is in the early stages of development. The Central California Ozone Study (CCOS) will contribute input databases and validation to an all-California BEIGIS simulation. Photochemical modeling improvements are also needed to account for methyl butenol, an important issue for ozone simulations in rural alpine locations. However, full understanding of the role of biogenic emissions in highly vegetated areas of California and their role in attaining the NAAQS are dependent on further developments. The ARB sponsored a biogenic symposium on December 9-10, 1999, to discuss the latest research in this area, particularly in California.

E. DEVELOPMENT OF THE SCM

1. 1998 Architectural Coatings Survey

In late 1997, ARB staff began working with manufacturers and industry groups to develop a new survey of architectural and industrial maintenance coatings sold in California. The last such ARB survey was undertaken in 1993 and surveyed sales and VOC contents of coatings sold in 1990. In February 1998, the ARB sent out the latest survey seeking 1996 sales data. Unlike previous surveys, this survey asked for information on the speciation of VOCs in an effort to identify what VOCs and non-VOC solvents are being used in architectural coatings, and to allow for an evaluation of the reactivity of the emissions. The final report was issued in September 1999.

Table II-1 shows a summary comparison between the 1993 and 1998 surveys (using 1990 and 1996 sales data, respectively). These data show that architectural coatings in California are continuing to shift toward waterborne, low-VOC coatings. In 1990, almost 75 percent of the paints sold were waterborne, while in 1996, waterborne paints made up over 80 percent of the total. In addition, the data also indicate that, on average, architectural coatings in 1996 had lower VOC contents than in 1990. Both of these trends seem to indicate that emissions from architectural coatings should be declining, assuming that the growth in population and housing do not cancel out any trend in reductions.

TABLE II-1
1990/1996 SURVEY COMPARISON

	1990	**1996**
Total volume, gallons	77.1 million	87.5 million
Waterborne/solvent-borne split, %	76/24	82/18
Estimated annual average emissions (tons per day)	126	117
Gallons per capita	2.6	2.7
Emissions per capita (pounds)	3.1	2.6

According to the 1998 ARB survey, architectural coatings are currently available that comply with the proposed VOC limits for coatings categories affected by the proposed SCM (Table II-2). These data indicate that low-VOC architectural coatings are already available and being used for many applications.

2. Durability and Performance Studies

a. Harlan Associates Study

In February 1995 the ARB published the results of performance testing of architectural coatings by Harlan Associates, Inc. The purpose of the study was to determine the physical properties and performance of representative products in eight coating categories. A total of 110 coating products, purchased during late 1993 and throughout 1994, were tested in the following categories:

- Industrial Maintenance Primers and Topcoats
- High Temperature Industrial Maintenance Coatings
- Lacquers
- Varnishes
- Nonflats (including Quick-Dry Enamels)
- Primer/Sealers (including Quick-Dry Primer/Sealers)
- Sanding Sealers
- Waterproofing Sealers (Wood and Concrete)

While the raw data from this study were published in 1995, an analysis of the overall comparison of the coatings' test performance was not published. In developing the proposed SCM, ARB and district staffs analyzed and summarized the raw data. This performance study, although somewhat dated, is used to supplement the newer National Technical Systems (NTS) study.

b. NTS Study

In support of the 1999 amendments to its architectural coatings rule (Rule 1113), the SCAQMD contracted with NTS to test performance characteristics of six significant architectural coating categories. The ARB staff has participated on the contract's technical advisory committee, which was established to oversee contractor selection, coating selection, testing protocol development, and results analysis. The study was initiated in May 1998, and an interim report was released in April 1999. In addition to the laboratory results, accelerated actual exposure, real time actual exposure, and actual application characteristics studies are continuing. The results of the study are an important part of our technical evaluation of these eight coating categories (see Appendix D, Description and Technical Assessment of the Coating Categories).

The purpose of the NTS study was to test the application and durability performance of very low-VOC, low-VOC, and just-compliant coatings for the following six coating categories:

- Industrial Maintenance Coatings
- Nonflat Coatings
- Primers, Sealers, and Undercoaters
- Quick-Dry Enamels
- Quick-Dry Primers, Sealers, and Undercoaters
- Waterproofing Sealers

TABLE II-2
SUMMARY OF CURRENTLY AVAILABLE COMPLIANT COATINGS

Coating Category	Number of Products in ARB Survey	SWA VOC Content (g/l) Solvent-Based	SWA VOC Content (g/l) Water-Based	Complies with Proposed Limit	
				# of Coatings	% of Total Sales Volume[1]
Flat Coatings	2,355	373	98	1,097	48.5
Nonflat Coatings					
Low Gloss	851	341	133	472	75.7
Medium Gloss	2,139	287	151	805	57.3
High Gloss	796	366	209	46	2.6
Antifouling Coatings	PD[2]	351	n/a	PD	100
Bituminous Roof Coatings	151	225	3	101	97.6
Bond Breakers	PD	750	345	PD	PD
Clear Wood Coatings					
Lacquers	299	665	220	87	8.5
Sanding Sealers	31	665	281	5	4.5
Varnishes	431	462	270	174	48.4
Concrete Curing Compounds	47	677	180	36	95.1
Dry Fog Coatings	51	367	182	46	96.6
Fire-Retardant Coatings					
Clear	PD	n/a	22	PD	100
Opaque	57	267	46	53	99.8
Floor Coatings	578	197	164	128	34.9
Form Release Compounds	13	247	2	PD	PD
Graphic Arts Coatings	108	628	10	18	81.2
High Temperature Coatings	93	367	222	54	52.5
Industrial Maintenance Coatings	2,759	321	170	941	28.0
Low Solids Coatings					
Stains	PD	n/a	77	PD	100
Wood Preservatives	PD	n/a	42	PD	100
Magnesite Cement Coatings	5	590	0	PD	PD
Mastic Texture Coatings	56	223	79	56	100

TABLE II-2 (CONTINUED)
SUMMARY OF CURRENTLY AVAILABLE COMPLIANT COATINGS

Coating Category	Number of Products in ARB Survey	SWA VOC Content (g/l) Solvent-Based	SWA VOC Content (g/l) Water-Based	Complies with Proposed Limit	
				# of Coatings	% of Total Sales Volume[1]
Metallic Pigmented Coatings	125	456	137	98	98.3
Multi-Color Coatings	22	520	268	13	65.8
Pre-Treatment Wash Primers	30	716	248	PD	PD
Primers, Sealers, and Undercoaters (PSUs)	765	358	106	404	73.6
Quick-dry Enamels[3]	154	403	n/a	PD	PD
Quick-Dry PSUs[4]	150	432	136	19	34.6
Roof Coatings	174	259	13	125	97.4
Rust Preventative Coatings[5]	25	382	144	16	63.5
Shellacs					
Clear	PD	614	n/a	PD	100
Opaque	PD	534	n/a	PD	100
Stains	1,323	440	163	337	52.8
Swimming Pool – General	18	438	147	PD	PD
Swimming Pool – Repair	6	569	n/a	0	0
Traffic Marking Coatings	161	290	124	107	53.4
Waterproofing Sealers	175	358	307	95	13.0
Wood Preservatives					
Below Ground	3	352	350	PD	PD
Clear	20	142	102	16	94.7
Semitransparent	25	390	218	20	74.1
Opaque	PD	658	132	PD	PD

1. Based on sales volumes reported in the 1998 Architectural Coatings Survey.
2. PD = Protected Data. Less than three companies reporting.
3. A number of nonflat coatings not included in this category also meet the definition of quick-dry enamel.
4. A number of PSU coatings not included in this category also meet the definition of quick-dry PSU coating.
5. These include products specifically listed as rust preventative in the ARB study. Other coatings that may be considered rust preventative coatings are included under other categories.

Results from the NTS study show that when compared to conventional, currently compliant coatings, low-VOC coatings available today have similar application and performance characteristics, including blocking resistance, mar resistance, adhesion, abrasion resistance, and corrosion protection.

Since the initiation of the NTS study, staff has received and reviewed detailed information pertaining to numerous compliant coatings for each category included in this proposal. Staff compared technical data provided for each coating in each category by the manufacturer to assess coverage, dry times, durability (adhesion, abrasion resistance, chemical resistance, impact resistance, scrubability, etc.), solids content by volume, and other characteristics. Some manufacturers have also forwarded actual laboratory test data and third party testing.

3. Meetings with District and U.S. EPA Representatives

In February 1998, staff began meeting with representatives of districts that will use the SCM as the basis for their district architectural coating rule. The U.S. EPA has also been involved to provide insight in harmonization with the national rule. The purpose of these meetings was to discuss:

(1) district needs and emission reductions needed from architectural coatings;
(2) findings of the 1998 architectural coatings survey;
(3) existing research and suggest future research needs;
(4) possible revisions to the 1989 SCM;
(5) scope and content of an environmental assessment that can be applied statewide; and
(6) opportunities for flexibility in how manufacturers can comply with coatings regulations.

Staff held 12 meetings and conference calls with the districts between February 1998 and January 2000.

4. Public Meetings and Meetings with Manufacturers

In developing the proposed SCM, ARB held seven public meetings attended by representatives from industry (resin manufacturers, coatings formulators, and coatings contractors), local districts, the U.S. EPA, and other interested parties. These public meetings were held on May 27 and August 20, 1998, and on March 30, June 3, July 1, September 8, and December 14, 1999. The July 1, 1999, meeting was a Scoping Meeting held to solicit input on the Draft Program EIR.

In addition to the above-mentioned public meetings, manufacturers held individual meetings with ARB staff. Over 20 individual meetings were held with manufacturers.

F. PROJECT OBJECTIVE AND DESCRIPTION

The proposed project is essentially a model rule designed to be considered for adoption by the local air pollution control and air quality management districts in California. The primary objective of the SCM is to set VOC limits and other requirements that are feasible (based on existing and currently developing coatings technology) and that will achieve significant reductions in VOC emissions from architectural coatings. The SCM is also intended to improve the clarity and enforceability of existing district architectural coatings rules and provide a basis for uniformity among architectural coatings rules in California. The proposed SCM sets allowable VOC content limits for a number of architectural coatings categories, including categories such as flats, nonflats, industrial maintenance, lacquers, floor, roof, rust preventative, stains, and primers, sealers, and undercoaters. The proposed VOC limits for most categories would become effective on January 1, 2003 (January 1, 2004, for industrial maintenance coatings).

Other components of the proposed SCM include a three-year "sell-through" provision (for coatings manufactured before the applicable effective dates), definitions, test methods, standards for painting practices and thinning of coatings, container labeling requirements, and reporting requirements.

Implementation of the proposed SCM is estimated to result in approximately 11 tons per day of VOC emission reductions statewide, excluding the SCAQMD. (The SCAQMD's recently revised Rule 1113 – Architectural Coatings is already in place, and 0.15 tons per day additional emission reductions from the interim limits are anticipated from implementation of the proposed SCM.) Table II-3 summarizes the proposed VOC limits and the associated projected emission reductions.

TABLE II-3
PROPOSED SCM VOC LIMITS AND ASSOCIATED ESTIMATED EMISSION REDUCTIONS

Category	VOC Limits (grams/liter)[1]	VOC Reductions in the State (excluding the SCAQMD[2]) (tons/day)
Flat Coatings	100	1.39
Nonflat Coatings	150	1.50
Antenna Coatings[4]	530	0
Antifouling Coatings	400	0
Bituminous Roof Coatings	250	0.01
Bond Breakers	350	0
Clear Wood Coatings Clear Brushing Lacquers Lacquers Sanding Sealers Varnishes	 680 550 350 350	 0 1.04 0 0
Concrete Curing Compounds	350	0
Dry Fog Coatings	400	0
Faux Finishing Coatings	350	0
Fire-Resistive Coatings	350	0
Fire-Retardant Coatings Clear Opaque	 650 350	 0 0
Floor Coatings	100	0.38
Flow Coatings	420	0
Form-Release Compounds	250	0
Graphic Arts Coatings (Sign Paints)	500	0
High Temperature Coatings	420	0
Industrial Maintenance Coatings	250	2.98
Low Solids Coatings	120[3]	0
Magnesite Cement Coatings	450	0
Mastic Texture Coatings	300	0
Metallic Pigmented Coatings	500	0
Multi-Color Coatings	250	0.01
Pre-Treatment Wash Primers	420	0
Primers, Sealers, and Undercoaters	200	0.77
Quick-Dry Enamels	250	0.99
Quick-Dry Primers, Sealers and Undercoaters	200	1.00

TABLE II-3 (CONTINUED)
PROPOSED SCM VOC LIMITS AND ASSOCIATED ESTIMATED EMISSION REDUCTIONS

Category	VOC Limits (grams/liter) [1]	VOC Reductions in the State (excluding the South Coast AQMD[2]) (tons/day)
Recycled Coatings	250	0
Roof Coatings[4]	250	0
Rust Preventative Coatings[4]	400	0
Shellacs Clear Opaque	 730 550	 0 0
Specialty Primers	350	0
Stains	250	0.64
Swimming Pool Coatings	340	0.03
Swimming Pool Repair and Maintenance Coatings	340	
Temperature-Indicator Safety Coatings	550	0
Traffic Marking Coatings[4]	150	0
Waterproofing Sealers	250	0.56
Wood Preservatives	350	0
TOTAL		**11.30**

1 Unless otherwise noted, units are grams of VOC per liter of coating, less water and exempt solvents.
2 SCAQMD limits are already in place; the SCM will achieve additional reductions of 0.15 tons per day in the SCAQMD (from the interim limits).
3 Units are grams of VOC per liter of coating, including water and exempt compounds.
4 Identical to the national rule limit. Accordingly, no additional reductions will occur from the proposed SCM limits. However, the national limit will result in emission reductions outside the SCAQMD. See Appendix D for details.

REFERENCES

Air Resources Board (ARB). "1997 Southern California Ozone Study – Overview." http://www.arb.ca.gov/research/scos/overview.htm (ARB, 1997)

ARB. "Central California Ozone Study (CCOS)." http://arb.ca.gov/ccaqs/ccos/ccos.htm July 16, 1999. (ARB, 1999a)

ARB. "1998 Architectural Coatings Survey Results Final Report." September 1999. (ARB, 1999b)

Arey, J., D.E. Crowley, M. Crowley, M. Resketo, and J. Lester. Hydrocarbon Emissions from Natural Vegetation in California’s South Coast Air Basin. *Atmospheric Environment* 29:2977-2998, 1995. (Arey *et al.*, 1995)

Benjamin, M.T., M. Sudol, D. Vorsatz, and A.M. Winer. A Spatially and Temporally Resolved Biogenic Hydrocarbon Emissions Inventory for the California South Coast Air Basin. *Atmospheric Environment* 31:3087-3100, 1997. (Benjamin *et al.*, 1997)

Censullo, A.C., D.R. Jones, and M.T. Wills. “Improvement of Speciation Profiles for Architectural and Industrial Maintenance Coating Operations, Final Report for ARB Contract 93-319.” June 30, 1996. (Censullo, 1996)

Chameides, W.L. and E.B. Cowling. “The State of the Southern Oxidants Study (SOS): Policy-Relevant Findings in Ozone Pollution Research 1988-1994.” North Carolina State University, Raleigh, NC. 1995. (Chameides and Cowling, 1995)

Environmental Legislative and Regulatory Advocacy Program of the California Paint & Coatings Industry Alliance (EL RAP). “Innovative Approaches to Regulating Architectural Coatings.” An Informal Concept Paper Prepared by the EL RAP Rule 1113 Task Force. July 24, 1998. (EL RAP, 1998)

Fujita, E.M. Desert Research Institute. Personal communication with Dale Shimp, ARB. October 4, 1999. (Fujita, 1999)

Fujita, E.M., Z. Lu, L. Sheetz, G. Harshfield, and B. Zielinska. “Determination of Mobile Source Emission Fraction Using Ambient Field Measurements.” Final Report for the Coordinating Research Council. July 23, 1997. (Fujita *et al.*, 1997)

Lashgari, A. ARB. Personal communication with ARB staff. December 1999. (Lashgari, 1999)

Seinfeld, J.H., R. Atkinson, R.L. Berglund, W.L. Chameides, W.R. Cotton, K.L. Demerjian, J.L. Elston, F. Fehsenfeld, B.J. Finlayson-Pitts, R.C. Harriss, C.E. Kolb, Jr., P.J. Lioy, J.A. Logan, M.J. Prather, A. Russell, and B. Steigerwald. *Rethinking the Ozone Problem in Urban and Regional Air Pollution*. National Research Council, Academy of Sciences, Washington, DC. ISBN 0-309-04631-9. 1991. (Seinfeld *et al.*, 1991)

Watson, J.G., J.C. Chow, and E.M. Fujita. “Review of Volatile Organic Compound Source Apportionment by Chemical Mass Balance.” Undated publication at: http://narsto.owt.com/Narsto/reactinfo.html. (Watson *et al.*, undated)